

Respiratory Protection



What is in an Atmosphere?

O E T

OXYGE

N

EXPLOSIV
ES

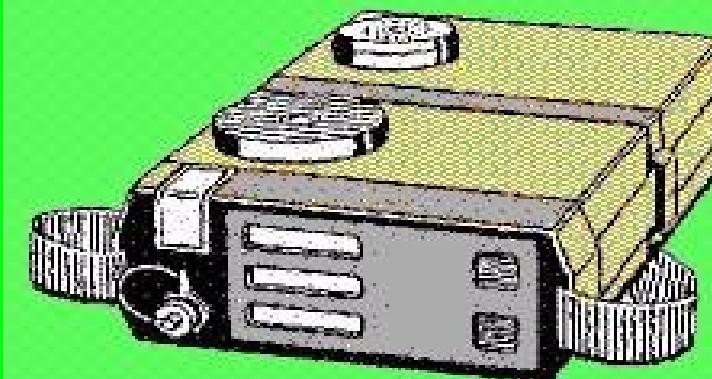
TOXICANT
S



Explosive Meters



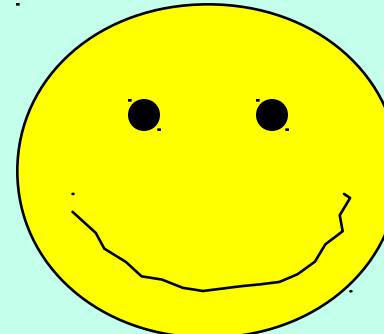
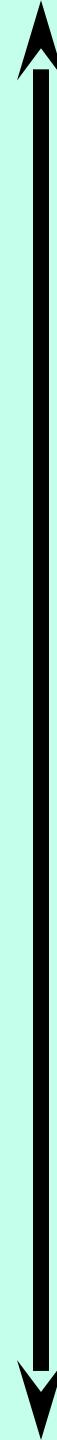
Tube type detectors



OXYGE



22 %
20.7 %
19.5 %
12 %
10 %
8 %



Normal at Sea
Level

OXYGE



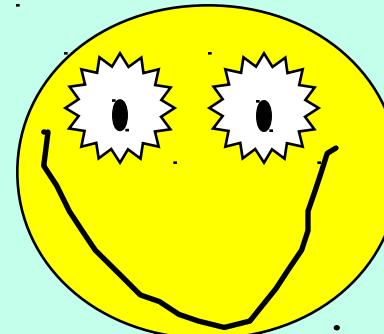
22
%

20.7
%

19.5
%

12
%

10
%

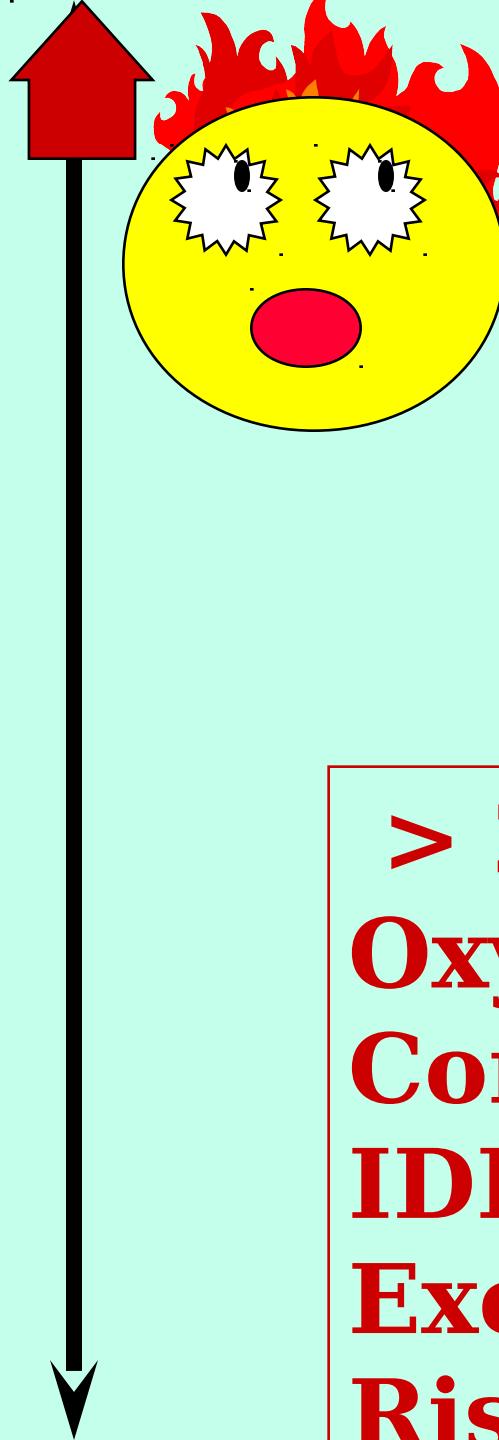


**Wide Awake,
Hyper
Vigilant**

OXYGE



22 %
20.7 %
19.5 %
12 %
10 %



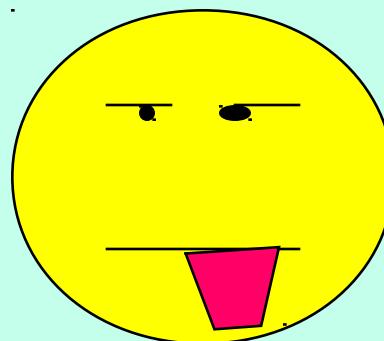
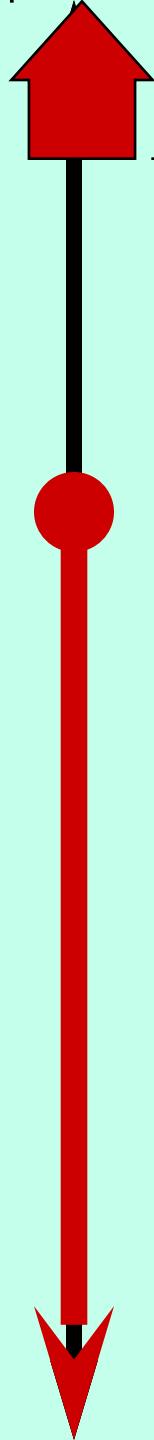
> 26 % O₂,
Spontaneous
Combustion Can
Occur

> 22 %
**Oxygen is
Considered
IDLH Due to
Exceptional
Risk of Fire**

OXYGE



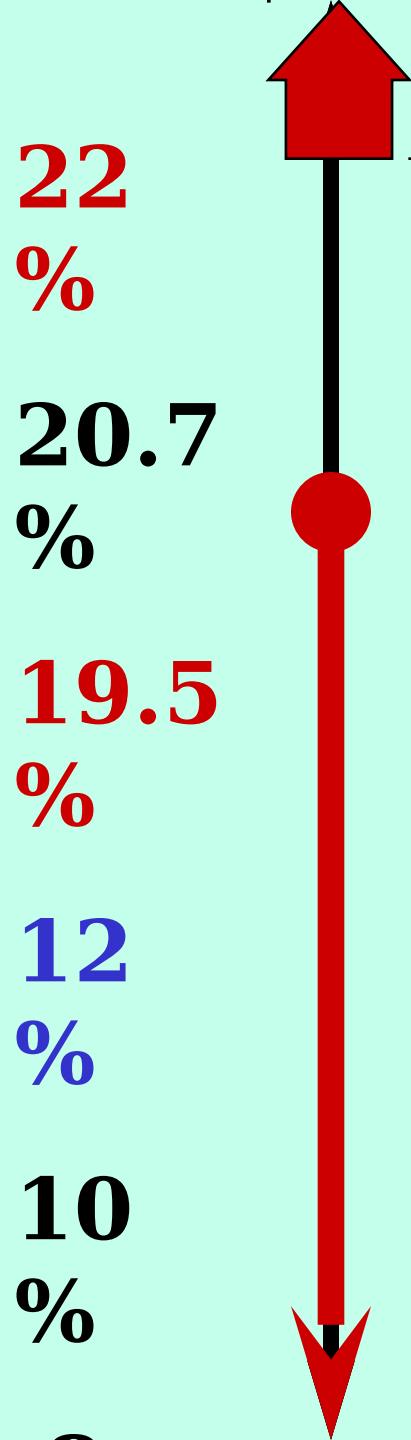
22 %
20.7 %
19.5 %
12 %
10 %



Loss of
Coordination, Loss
of Perception,
Lack of Judgment

**< 19.5 % Oxygen
Considered
IDLH by OSHA --
Entry Requires
CO's Permission**

OXYGE



Blue Lips,
Disorientation

OXYGE



22
%

20.7

%

19.5

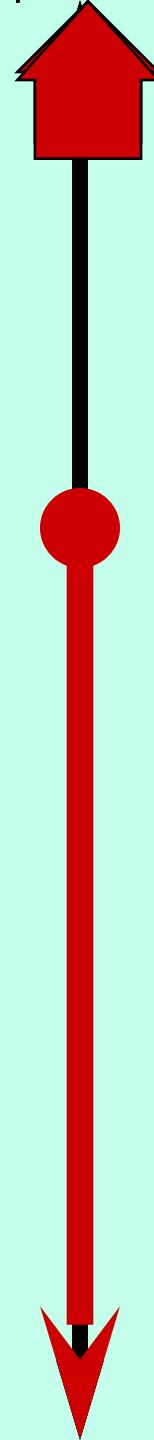
%

12

%

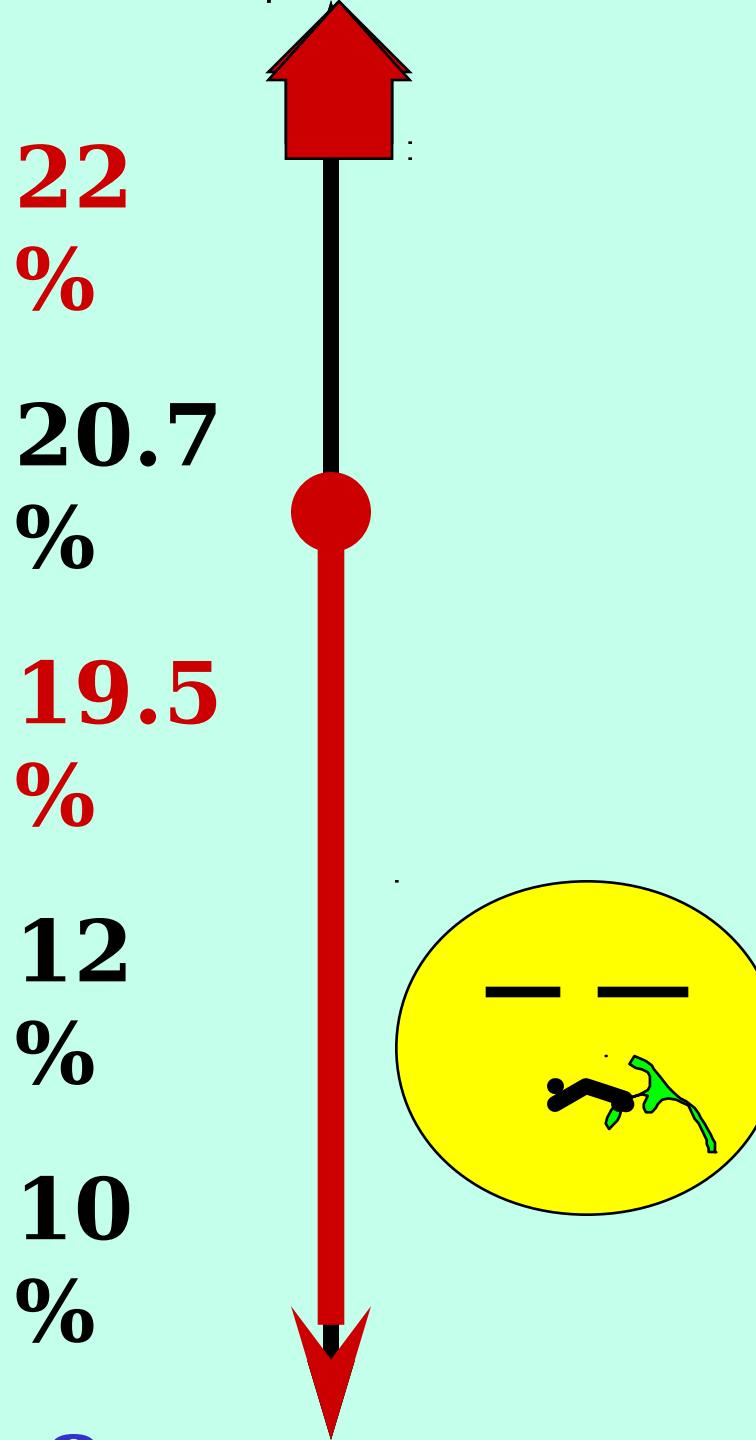
10

%



Vomit

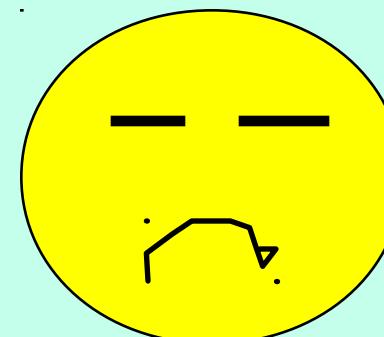
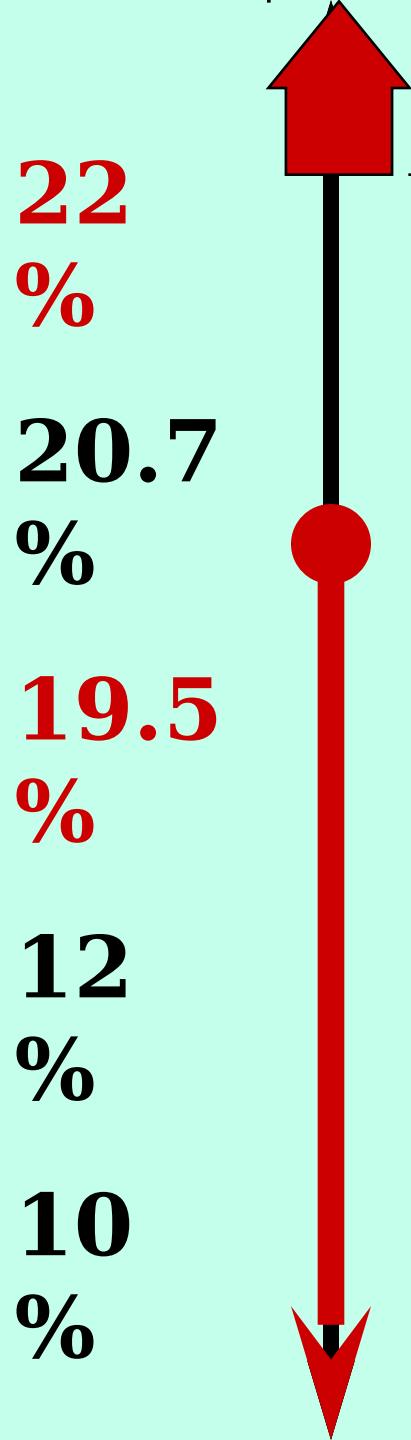
OXYGE



Unconscious

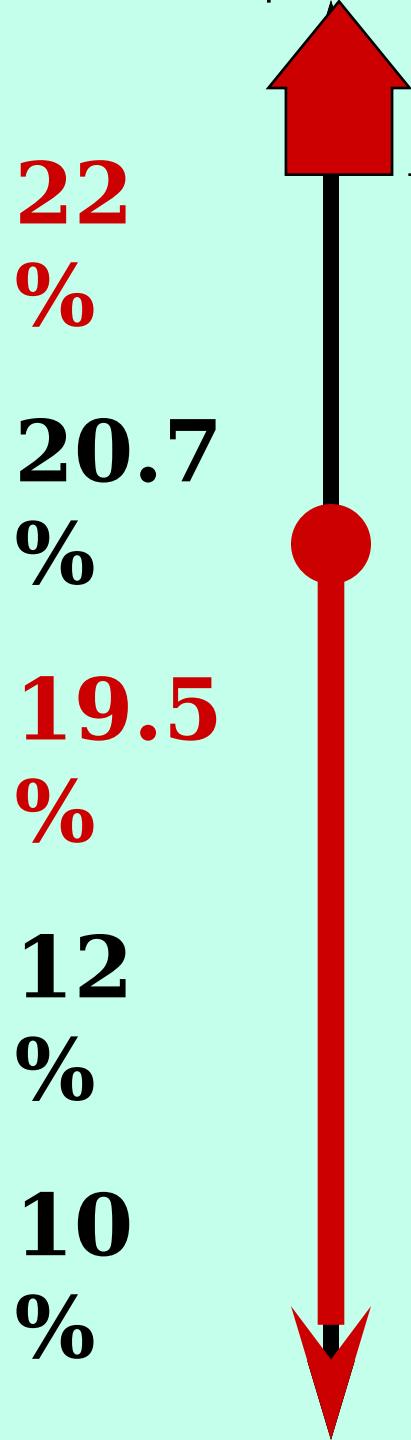
5 min : Could
recover 6 min:
50% Fatal 8
min: 100% Fatal

OXYGE



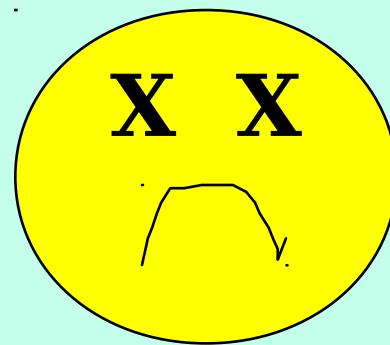
Coma in
40
Seconds

OXYGE



Just
Remember . . .

Oxygen Levels
Greater than
22% or Less
than 19.5% are
IDLH !

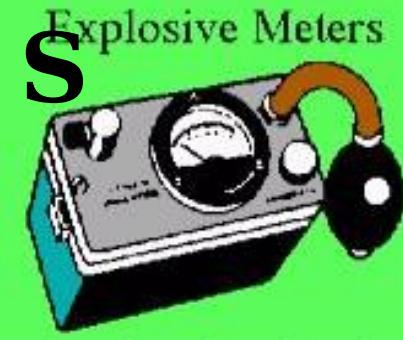


Death

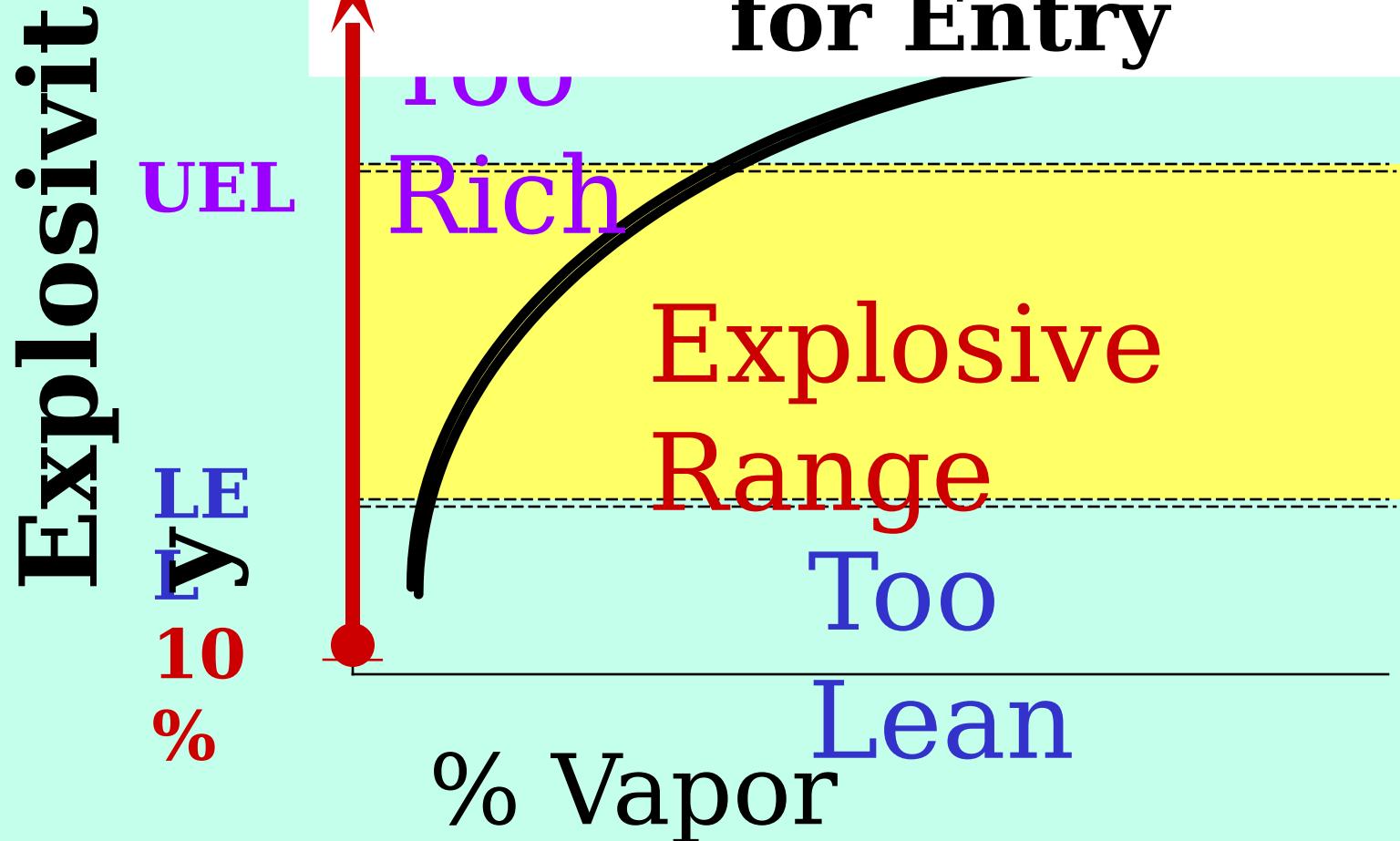
Reasons for Oxygen deficiency:

- **Fires**
- **Rusting (Oxidation)**
- **Inerting**
- **Decomposing Organic Matter**
 - **Sewage**
 - **Fermentation of grains, sugars, etc.**

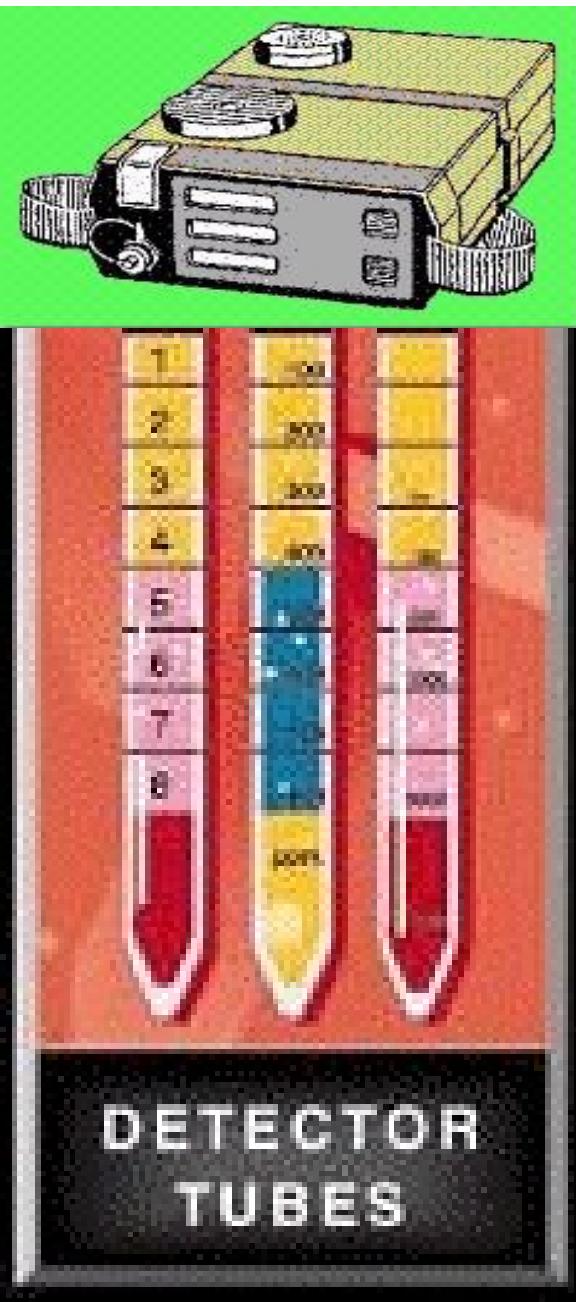
EXPLOSIVE



**Greater Than 10% LEL is
Considered IDLH -- and
Requires CO's Permission**



Toxic



Common Shipboard Hazards

Carbon Monoxide Hydrogen Sulfide

Halon & Freon

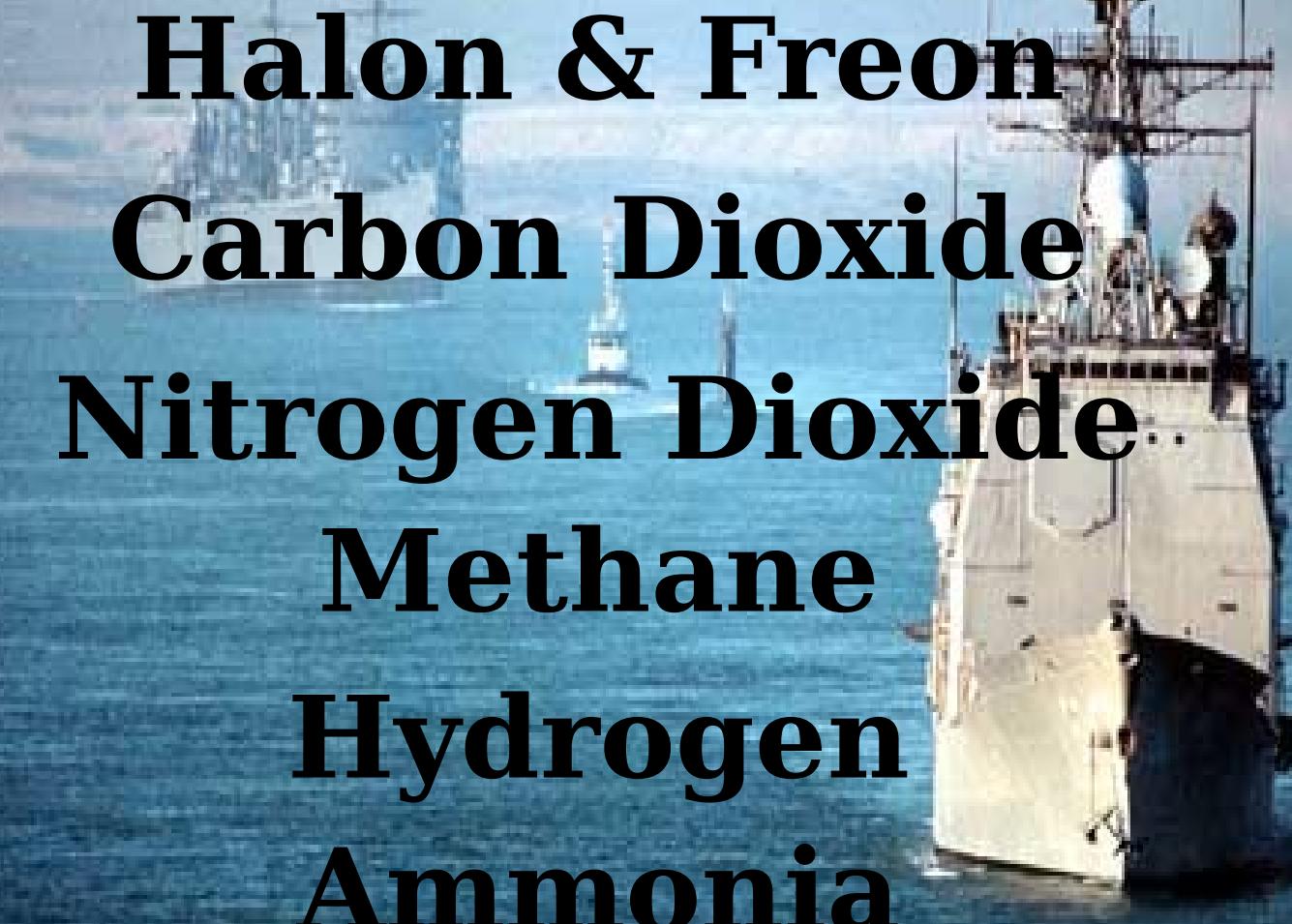
Carbon Dioxide

Nitrogen Dioxide

Methane

Hydrogen

Ammonia



Man Killed By Own Gas

Bloomberg News Service, 25 March

A terrible diet and a room with no ventilation are being blamed for the death of a man who was killed by his own gas. An autopsy revealed large amounts of methane gas in his system.

His diet consisted primarily of beans and cabbage. It was just the right combination of foods.

It appears that the man died in his sleep from breathing the poisonous cloud that was hanging over his bed. Had his windows been open, it wouldn't have been fatal. But the man was shut up in his near airtight bedroom.

He was a big man with a huge capacity for creating this deadly gas. Three of the rescuers got sick and one was hospitalized.

Supplied Air Respirator w/
15 minute backup Air Required

IDLH

H

Respiratory Protection Mandate

(Filter Type Respirator
or Supplied Air Respirator
as Appropriate)

PEL

Respiratory Protection Option

REPAIR AND MAINTENANCE ACTIVITIES

- Generate air contaminants
- Ventilation most effective method of protection
- When not practical, respirators necessary

6 Elements of a Respiratory Protection Program

ADMINISTRATION

- Respiratory Protection Officer
 - Assigned by the CO
 - Administers program
 - Ensures there is a written SOP
 - Maintains roster of personnel in program
 - Ensures users are:
 - Fit Tested
 - Medically Qualified (done by DOC)
 - Trained in the wearing, usage, and storage
 - ANNUALLY

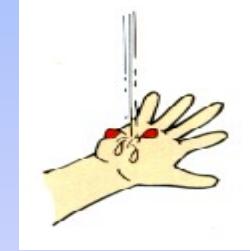
KNOWLEDGE OF HAZARDS Toxic Materials

Enter Body 3 Ways

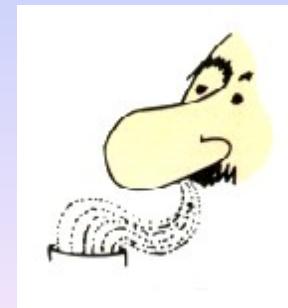
✿ Ingestion (eating, drinking)



② Absorption (touching)



③ Inhalation (breathing)

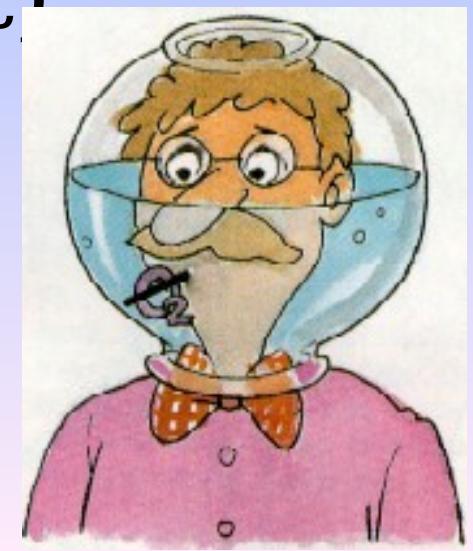


CONTROL OF RESPIRATORY HAZARDS

But first, we have to know
what the Respiratory Hazards
are...

RESPIRATORY HAZARDS

- **OXYGEN DEFICIENCY -**
- Occurs in Confined Spaces when oxygen is displaced or consumed (less than 19.5%)
- Chemical Reaction (rust)
fire, welding



RESPIRATORY HAZARDS

- ***CONTAMINANT LADEN***
- Particulate Matter (dust, fumes, mist)
- Gases or Vapors
- Combination of gaseous and particulate

CONTROLLING HAZARDS

✓ HAZARD ASSESSMENT

- Gas free tests for:
 - Oxygen
 - Explosives
 - Toxics

✓ HAZARD CONTROL

- Nature of work:
 - Spray Painting
 - Solvent Cleaning
 - Power Sanding
 - Welding
 - Sandblasting

SELECTION OF EQUIPMENT

✓ **ONLY NIOSH/MSHA APPROVED**

- IDLH Conditions
- Concentration
- Oxygen deficiency possible
- Degree of protection



CLASSES OF RESPIRATORY PROTECTION EQUIPMENT

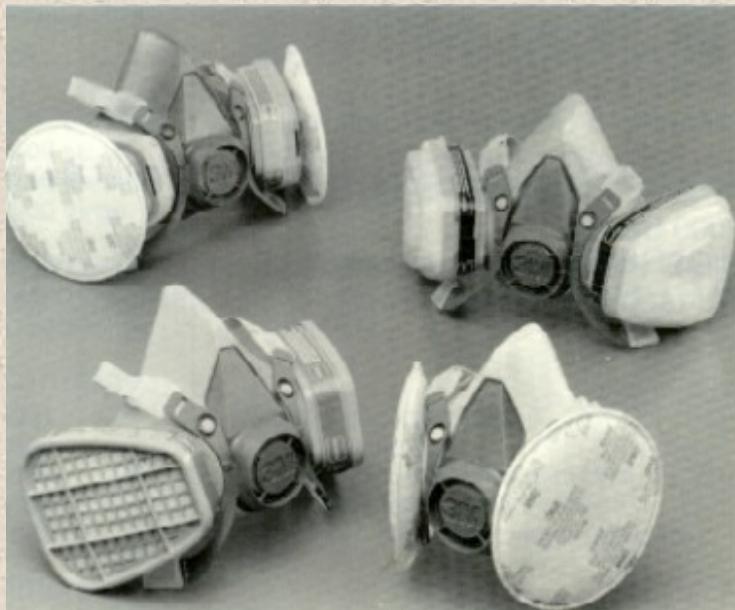
- Air Purifying
- Supplied Air

AIR PURIFYING

- Remove contaminants from atmosphere
- Do not generate oxygen (must be used in 19.5 - 22% O₂ atmosphere)

AIR PURIFYING

- ① Mechanical - protection from particles (dust, fumes, fog)
- ② Chemical - vapors and gases in low concentrations



CARTRIDGE SELECTION

- Color coded for intended use

➡ **LISTING OF COLOR CODE:
MANUFACTURER'S
CHART NAVOSH**

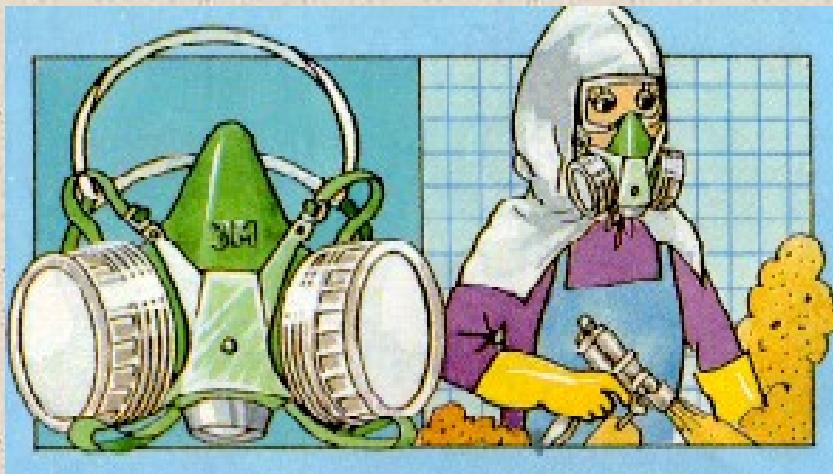
MANUAL B-6

- Filters labeled
- Cartridge combinatio



REUSABLE HALF MASK

- Replaceable cartridges to capture gases and vapors
- Prefilter to trap particles



SUPPLIED AIR RESPIRATORS

- Air-line
- Self-Contained Breathing Apparatus (SCBA)

DEMAND MODE

- Supplies air upon user inhalation
- Creates negative pressure within facepiece
- Some leakage may occur

PRESSURE DEMAND

MODE

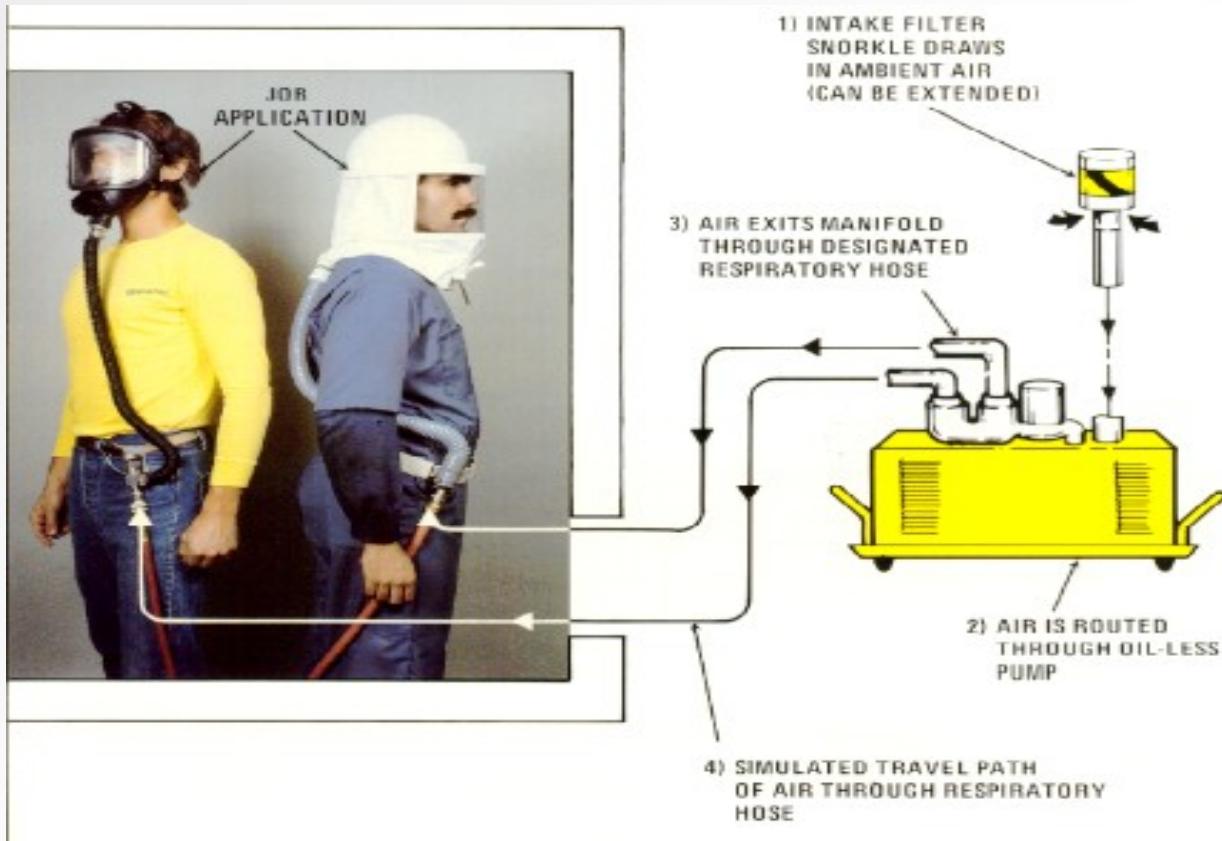
- Continuous **positive** pressure within facepiece
- Prevents leakage into facepiece
- SCBA (Scott Air Pack)
- SAR with SCBA

CONTINUOUS FLOW

- Continuous ***positive pressure and flow*** of air to facepiece
- Rhine Air Pump

RHINE AIR PUMP

- LP air driven
- Ambient air
- 50 Ft collapsible hose
- 2 Person capacity
- Snorkle
- ***No back-up air!***



RHINE AIR PUMP

IDLH RESPIRATORY REQUIREMENTS

- “Full facepiece, SCBA in pressure demand mode”
or
- “Full facepiece air-line respirator in pressure demand mode with 15 minute auxiliary air supply” NSTM 074 vol 3

SUPPLIED AIR RESPIRATOR WITH SCBA (SAR WITH SCBA)

- Fulfills requirements of
NSTM 074 Vol 3

**USN LATEST AND GREATEST IN
RESPIRATORY PROTECTION**

PASP

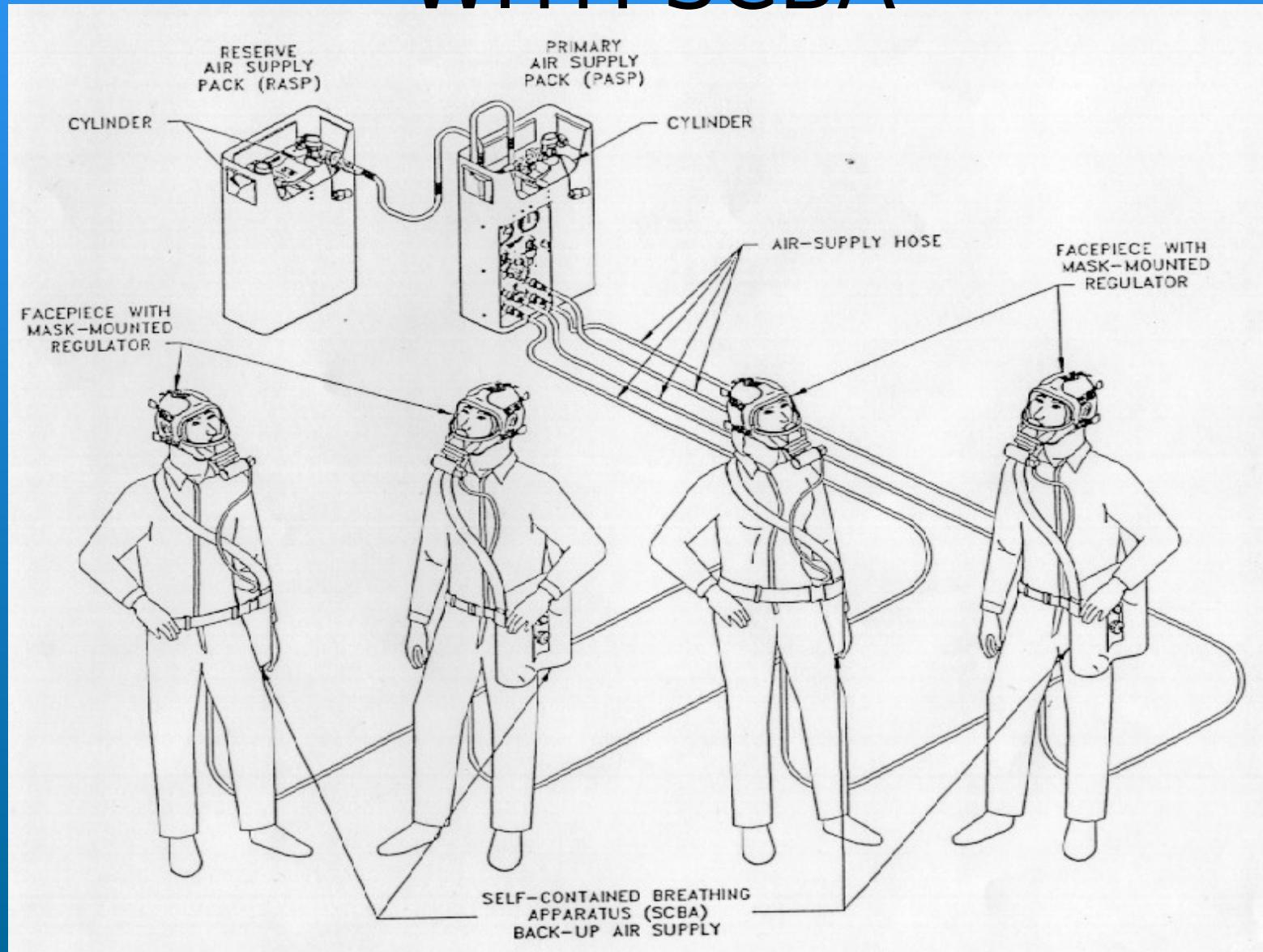
RASP

SCBA



**SUPPLIED AIR RESPIRATOR WITH
SCBA
(SAR WITH SCBA)**

SUPPLIED AIR RESPIRATOR WITH SCBA





USS REUBEN JAMES (FFG 57)- Golfito Costa Rica 2014

Questions?